

1 **What is claimed is:**

- 2 1. A method for providing a tortuous path in diffusion bonded plates, comprising:
3 constructing restrictive elements with features in various shapes by lithographing
4 an image of the features onto one or more substrates;
5 etching the image of the features into the one or more substrates; and
6 bonding the one or more substrates to form flow channels, whereby the flow
7 channels include an integrated tortuous flow path functioning as integrated filters.
8 2. The method of claim 1, wherein the constructing step includes constructing the
9 restrictive elements with features having random characteristics.
10 3. The method of claim 1, wherein the constructing step includes constructing the
11 restrictive elements with cross-section shapes of circles.
12 4. The method of claim 1, wherein the constructing step includes constructing the
13 restrictive elements with cross-section shapes of polygons.
14 5. The method of claim 1, wherein the constructing step includes constructing the
15 restrictive elements using an image of a frit structure.
16 6. The method of claim 1, wherein the constructing step includes constructing the
17 restrictive elements using an image of a foam structure.
18 7. The method of claim 1, wherein the constructing step includes constructing the
19 restrictive elements using a simulated image of a foam structure.
20 8. The method of claim 1, wherein the flow channels have non-linear configurations
21 to add length of the integrated tortuous flow path.
22 9. The method of claim 1, wherein the bonding step includes bonding the one or
23 more substrates using diffusion bonding technology.
24 10. The method of claim 1, wherein the lithographing step includes lithographing the
25 image of the features symmetrically on mating substrates.
26 11. The method of claim 1, wherein the lithographing step includes lithographing the
27 image of the features asymmetrically on mating substrates.
28 12. A substrate having a tortuous flow path for fluid handling, comprising:
29 restrictive elements with features of random characters, an image of the features
30 being lithographed onto one or more substrates and etched into the one or more
31 substrates, wherein the one or more substrates are bonded together to form flow channels;
32 and
33 an integrated tortuous flow path formed within the flow channels and functioning
34 as integrated restrictors.

- 1 13. The substrate of claim 12, wherein the restrictive elements are constructed using
2 an image of a frit structure.
- 3 14. The substrate of claim 12, wherein the restrictive elements are constructed using
4 an image of a foam structure.
- 5 15. The substrate of claim 12, wherein the restrictive elements are constructed using a
6 simulated image of a foam structure.
- 7 16. The substrate of claim 12, wherein the flow channels have non-linear
8 configurations to add length of the integrated tortuous flow path.
- 9 17. The substrate of claim 12, wherein the integrated tortuous flow path functions as
10 integrated filters.
- 11 18. A system for providing a tortuous path in diffusion bonded plates, comprising:
12 one or more substrates bonded together to form flow channels; and
13 an integrated tortuous flow path formed within the flow channels by lithographing
14 an image of features in various shapes onto the one or more substrates and etching the
15 image of the features into the one or more substrates, the integrated tortuous flow path
16 functioning as integrated filters.
- 17 19. The system of claim 18, wherein the features having random characters.
- 18 20. The system of claim 18, wherein the integrated tortuous flow path is formed by
19 lithographing an image of a foam structure onto the one or more substrates.